Conization of Cervix With the Electric Scalpel

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I wish to state that the electric scalpel (or electric knife), is not a knife nor a cautery, but just an electric applicator.

The day was when a physician who used electricity was considered a faker, but today if he does not use it he is considered a fogie.

Diathermy like every other innovation, has passed through a period during which its over-enthusiastic, but often misinformed advocates, caused many practitioners to doubt its efficacy. With more careful observation and earnest and persistent investigation, the possibilities are becoming more appreciated, while the indications and contraindications for its use are better understood. Particularly is this true in its surgical application to gynecological disorders, the subject of this presentation.

Dr. Howard Kelly says that electro-surgery is par excellence, a knife and fork procedure. To those who have learned its technique and its possibilities, in its proper special fields, it is as far superior to our most ancient and honorable scalpel surgery, as is the electric tramway ahead of the lumbering horse cars of our youthful days.

It is indeed a curious reflection that after milleniums of scalpel surgery, with its attendant ligating, needling, and suturing, in this age, so ancient a craft as ours should be called upon, like Benjamin Franklin, to snatch the power from the lightning which flashes in the heavens and from the electric spark of the rubbed amber with which to attack our worst enemy, cancer.

In presenting this paper, I do not intend to review the voluminous literature, past or present, or discuss the relative merits of the numerous methods of treatment advocated and practiced for the relief of endocervicitis, conceded to be the most prevalent of all gynecological disorders. It occurs in 85 per cent of women, is insidious in onset and course, is highly resistant to the ordinary therapeutic methods, and shows little or no tendency to spontaneous cure. Dr. Charles Mayo says that when you get a history of a woman treating with an eye man, to look at the cervix, for most invariably they will have an infected cervix, especially if the eyes are red, and having glasses changed often.

It is my purpose to outline conization of the cervix with the electric scalpel, devised by Prof. M. N. Hyams of the New York Post Graduate Medical School, and the results obtained from 350 cases so treated.

Since all present are not gynecologists, a brief resume of the anatomy, histology, and pathology of the cervix necessarily precedes the presentation of the subject matter proper, in order that the rational of the treatment may be better understood. Only by a thorough study of the normal cervix and structural changes in the diseased endocervix can the efficiency of any method of treatment be judged.

The lower part of the uterus or cervix is about one inch long and arbitrarily divided into three subdivisions: the supravaginal, intermediate, and vaginal; limited distally by the external os, and proximally by the internal os. The anterior fornix is shallow, the posterior deep. The muscular layer contains a large amount of connective tissue and hence is firmer than the body of the uterus. At the isthmus the circular artery furnishes the blood supply. There are no sinuses in the cervix similar to those found in the uterus.

The distal portion of the cervix or external os is approximately five millimeters in its transverse diameter; sometimes circular, often oval, and covered by stratified squamous epithelium. Following pregnancy, instrumentation, infection, trauma, or disease, the os may be distorted or enlarged. The size can vary from a minimum, slightly larger than normal, to a maximum, when the circumference of the os coincides with the diameter of the cervix at its lower end. The internal os is circular, about one millimeter in diameter and rarely changes its definite shape.

The cervical canal, about one inch in length, lies between the internal and external os. It is fusiform or spindle shaped, its widest diameter nearly on a level with the posterior fornix and the narrowest portion at the internal os. So far as we know, it acts only as a passage way between the uterus and the vagina. The canal is lined by mucous membrane which is almost one millimeter in thickness and presents a longitudinal ridge of its anterior and posterior surfaces from which a large number of folds or rugae branch off obliquely and laterally, connecting these two ridges. Due to the numerous folds and plications this relatively small surface is increased in actual area, presenting an extensive surface to infection.

The epithelium at the isthmus is of the low columnar or cuboidal variety, some nuclei, being near the upper portion of the cell, others either at the center or the base. Advancing toward the external os, this epithelium becomes of the high columnar, ciliated variety, about forty by four micrones in size, with a constant basement nucleus. At or about the junction of the middle and lower third of the cervical canal, a change takes place in the epithelium, the simple columnar gradually undergoing transition to the stratified variety. There is a definite basement membrane below the entire epithelium.

Scattered throughout the mucous membrane are many simple tubular glands about one to two millimeters long, similar to those found in the uterus, but the racemose variety predominates. The ducts open into the cervical canal. The glands usually stop at the basement membrane though some extend beyond this structure, the depth from the surface being about three millimeters or one-eighth inch. Approaching the internal os the glands become fewer and more shallow, and it is conceded that infection rarely, if ever, originates at this particular location.

There is a difference of opinion as to whether bacterial infection spreads by continuity or by the lymphatics. Regardless of the manner in which this takes place, it is a fact that primary infection of the cervix ascends into the uterus, fallopian tubes, ovaries, and parametrial tissues.

The extent and rugosity of the cervical mucosa affords innumerable recesses for pathogenic organisms, while the traumatized and lacerated cervix is an open door to infection. The mucosa of the cervix becomes swollen, oedematous, and often everted with a loss of its cilia, while the mucosa of the portio about the external os presents a circumscribed area of glandular proliferation. The earliest stage of cervical infection represented by an infiltrated area denuded of squamous epithelium, the result of necrosis and maceration of the surface layer, a true erosion but rarely seen at this stage.

The columnar epithelium under constant irritation of infection pushes itself out on to the vaginal aspect of the cervical rim, replacing the stratified epithelium, producing the so-called, "erosion," classified as simple, if the surface is smooth and the glands few in number with no dilatation; follicular, if the glands are numerous and dilated; and papillary, if the glands are numerous, running downward, parallel to one another, producing a papillary appearance, due to the numerous stroma papillae which project upward between the glands. The continued congestion produces a hypersecretion of mucous from the infected glands and ultimately a hypertrophy and hyperplasis of the cervical connective tissue. Sooner or later the crypts or the ducts of these glands become occluded, resulting in subsequent cyst formation commonly known as Nabothian cysts. This cystic condition increases the bulk of the already hypertrophied cervix, interfering with normal circulation and muscle contractility.

The symptoms are so well known that they are regarded as classic, which are; discharge, backache, pain in lower abdomen, dysuria, metrorrhagia, dysmenorrhea, pruritus, headache, sterility, menorrhagia, and dyspareunia, as can be expected from the pathological changes described.

Reviewing what has gone before, the following facts are obvious:

1. The cervical canal is about one inch long and spindle shaped.
2. Infection is generally of the ascending type.
3. The brunt of infection is borne by the lower portion of the cervical canal.
4. The internal os and surrounding area are rarely, if ever, infected.
5. The glands are always infected.
6. The crypts and rugae of the cervical mucous membrane are excellent hiding places for pathogenic organisms.

7. Nabothian cysts result from occlusion of the gland ducts or from pressure.

8. The lining membrane of the cervical canal is one or two millimeters in thickness and has no submucosa, the glands reaching to the basement membrane.

9. Some of the glands extend beyond the basement membrane into the stroma of the cervix.

10. Simple tubular and racemose glands are found, but the latter predominate.

11. The anatomical arrangement of the mucous membrane increases materially the surface area of the canal.

12. The main cervical arterial supply is near the isthmus, thus far removed from the diseased mucous membrane.

Having briefly reviewed the anatomy and histology of the cervix and the pathology of endocervicitis, we come to a consideration of nature's healing process and the possibility of expediting it by treatment of the diseased area. With a clear understanding of how the reparative process progresses, the appropiate treatment suggests itself, thus assuring the patient a more rapid recovery, with a minimum impairment of cervical function, so important in subsequent parturition.

As an inflammation subsides, squamous epithelium proliferates from the sides or regenerates from scattered islets still remaining beneath the columnar epithelium and displacing it. The squamous epithelium enters the neck of the glands and in some cases succeeds in entirely replacing the columnar variety normally lining these glands, filling them with a solid squamous plug and obliterating them. In other cases, only the gland openings are closed and retention or Nabothian cysts result. It is therefore evident that the natural healing process produces the replacement of the columnar epithelium of the cervix by stratified squamous epithelium, while the racemose glands are compressed by a mass of stratified squamous epithelium, which completely fills and obliterates them. These findings are the result of microscopic study of sections removed from healed cervices, three and six months after conization.

The healed cervix differs from the normal in that squamous epithelium has replaced the columnar type and the racemose glands have been filled and obliterated by the inroads of the same variety. Thus nature cures by mechanical obliteration, and any therapeutic procedure capable of producing the same effects is in accordance with the natural curative alterations.

It is conceded that when any of the various papular methods of treatment, short of complete endocervical removal, fails to cure or relieve, a radical tracheloplasty becomes the method of choice, because it completely removes the diseased mucosa with its deeply infected glands. It is attained by a minimum amount of trauma to, and destruction of, the underlying muscular fibres.

If it can be admitted that the obvious method of treating diseased tissue is its removal in its entirety, assuming that such an excision is not inimical to life or future vital function, it logically follows that any such method of treatment becomes the ideal method to adopt in treating diseased tissue, whether in the cervix or elsewhere.

Conization is not based on theory or speculation. It is sound in principle and is based firmly on a foundation of demonstrated facts in the anatomy, histology, and pathology of the cervix. The natural process of healing is not interfered with; on the contrary, it is aided and furthered. While nature attempts to cure by sealing up or obliterating the diseased glands, they still remain in situ, whereas conization removes not only the diseased glands in the mucous membrane lining, but also the tissue in which they are embedded, thereby promoting lymphatic drainage, so important for complete cure. The relining of the cervical canal proceeds rapidly and eventuates in a cervix with intact anatomical structure and a canal lined by squamous instead of the original columnar epithelium.

Conization has for its object the eradication and destruction of the diseased endocervical mucous membrane with its contained glandular structures, and this is accomplished with the preservation of the underlying muscle as well as the uninvolved tissues.

Local anesthesia only is necessary to insure a painless operation, making it an office procedure with no economic loss to the patient.

The instrument used in conization consists essentially of four parts as follows:

1. A metal tube ten or twelve inches long and one-eighth inch in diameter.

2. A silicon tube one and one-half inches long, attached to the distal end of the metal tube.

3. A fine tungsten wire, attached at the metal-silicon junction, its other end fitted into the distal extremity of the silicon tube. This tungsten cutting wire is not straight but describes an arc with its widest portion one-eighth inch distant from the silicon tube. It thus conforms to the normal anatomical contour of the cervical canal which is fusiform or spindle shaped. To facilitate removal of tissue from angles, corners, or for biopsy, applicators with various shaped cutting wires have been made.

4. An insulating sheath of hard rubber encircles the metal tube to within one inch of its proximal extremity.

The applicator is connected directly to the source of current, with a swivel joint that insures perfect freedom of the instrument without movement of the cord.

The instrument is operated from a high frequency machine incorporating a special unit generating an electrical current of high wave frequency supplying unusual power to the cutting wire. This apparatus may be either of the gap or radio tube variety.

TECHNIC

1. The patient is placed in the lithotomy position, with legs well separated, and draped in the usual manner.

2. The operator seats himself comfortably before the patient.

3. The vaginal speculum is inserted to expose the cervix.

4. The vagina and cervix are freed of all discharge by swabbing with caroid powder and hydrogen peroxide and wiped dry. It is important that the cervical canal be free of all discharge.

5. A small crystal of cocaine is placed in the cervical canal and allowed to dissolve, or an applicator saturated with 35 per cent solution is introduced into the cervical canal from five to ten minutes.

6. The inactive, wet metal electrode about six by six inches in size, connected to the high frequency machine through a conducting wire, is placed on the abdomen and held firmly in place by means of a strap or sand bag; the patient is directed to make firm compression with both hands, so as to distract her attention.

7. The depth of the cervical canal is measured and the depth on the instrument is noted.

8. The current is turned on until a stage is reached which will provide sufficient current for the operation.

9. The instrument is held firmly in the hand. The other hand steadies the instrument.

10. The tip of the instrument is placed about one-eighth inch from the external os and the foot switch closed, thereby turning on the current. A burning or searing of the tissue should take place.

11. With the current still on, the silicon portion of the instrument is immediately passed into the cervical canal up to the internal os, and with a rotary motion the mucous membrane is coned out.

12. The foot switch is released and the instrument withdrawn. The mucous membrane with its contained cervical glands will be found adhering to the tungsten wire and the silicon tube, and a few drops of blood may appear in the cervical canal.

13. The instrument may be re-introduced and more tissue removed by repeating the previous steps if the operator so desires.

14. An applicator saturated with 2 per cent mercurochrome solution is now placed in the cervical canal and left in situ for several minutes.

15. A light packing of the vagina with gauze moistened with mercurochrome solution, 1 per cent, is all that is needed to control the slight amount of bleeding which might occur.

16. The patient is allowed to leave the table.

17. The entire operation should not take more than a few minutes. About the fourth day a grayish slough will be found filling the cervical canal and is easily removed with a dressing forceps. The cervix and vagina are swabbed with 1 per cent mercurochrome solution. On the seventh day the cervical canal will be found smaller in size and granulation tissue can be seen. Between the second and third weeks the cervix approximates its normal size with only several small unhealed areas visible. About the fourth week the eroded areas are completely covered by squamous stratified epithelium and the entire cervix presents a healthy appearance. Vaginal douches are neither advised nor necessary.

As surgery for cancer of the cervix is generally contraindicated, the loop is used to cut out all diseased tissue possible before applying radium.

I would like to give a resume of 189 patients coned from January, 1927, to January, 1929, and rechecked while I was attending Dr. Hyam's clinic from July 1st to October 1st, 1929.

HISTORY OF SYMPTOMS

Discharge	70
Backache	48
Pain in lower abdomen	45
Dysuria	9
Metrorrhagia	6
Dysmenorrhea	5
Pruritus	5
Headache	4
Sterility	4
Menorrhagia	2
Dyspareunia	2

Discharge, backache, and pains in the lower abdomen were the most frequent symptoms complained of, either alone, or in varying combinations.

AGES

Under 20 years	1
20-25 years	17
25-30 years	22
30-35 years	28
35-40 years	26
Over 40 years	17

A study of age incidence shows that in their cases, endocervicitis occurred most frequently after the age of thirty years, but girls have erosions. A German has reported finding an over growth of the columnar epithelium in girls of all ages, back to six months in embryo. That this is a condition which frequently follows childbirth is evidenced by the following.

Sterile	17
Miscarriages, one or more	37
Para one	25
Para two	26
Para three or more	35
Instrumental delivery	14

PATIENTS RE-EXAMINED

September, 1929	48
Improved	46
Failed, requiring re-conization	2
Cervices showing visible scar tissue	0
Cervical contractures	0
Cervical stricture	0

Three women had become pregnant. Three others still showed uterosacral infiltration on examination, but had no discomfort or symptoms.

Eight showed small erosions of a type easily healed by local application. These patients were likewise free of symptoms.

ADVANTAGES

1. The method is used for the treatment of ambulatory patients.

2. The patient suffers no pain or discomfort, as the nerve ends are cooked.

3. The symptoms are relieved because the mucous membrane with its contained glands is removed, thus aiding nature in repair and at the same time expediting the healing process.

Healing is more rapid than in an average surgical case left to granulate. The scar is softer and less disfiguring.

4. The danger of subsequent bleeding is practically nil.

5. No muscular tissue is removed, the cervix remaining functionally normal and future parturition is not interfered with mechanically.

6. The technic, easily acquired, can be carried out by the surgeon. The operation, especially in infected areas, is a pleasure.

The cervix need not be drawn down to the vaginal introitus, thus avoiding the possibility of subsequent retrodisplacement of the uterus.

7. The cutting proceeds smoothly, the generated heat assuring asepsis.

Diseased glands are exploded often in situ and caused to absorb. Diseased cells and infection is also destroyed.

8. Tissue can be removed to any desired depth.

9. Conization can be used for removing tissue for the microscopic examination particularly in cases where dilatation and trauma are inadvisable.

10. The procedure may be repeated as often as is deemed advisable to accomplish its object.

11. Removal of the diseased tissue promotes and facilitates lymphatic drainage.

12. Conization results in a minimum of scar tissue because of division of the tissue is accomplished far more accurately than with the finest knife.

Conization is not recommended as a cure-all for any type of gynecological disorder. To insure success all pathology extraneous to the cervix must be carefully looked for and treated. Symptoms due to other causes than endocervicitis must be traced to their site of origin, *e. g.*, a discharge resulting from uterine retrodisplacement must have its own specific treatment.

In conclusion, conization is offered as an additional link in the chain of progressive methods devised and in use to relieve the symptoms of chronic endocervicitis with the least discomfort to the patient.

BIBLIOGRAPHY

Hyams, M. N.: High Frequency Current in the Treatment of Chronic Endocervicitis. Archives of Physical Therapy, X-Ray, Radium, April, 1930.

Kelly, Howard A.: Electrosurgery. Surgery, Gynecology, and Obstetrics. February 15, 1931.

Hyams, Mortimer N.: Surgical Diathermy in Gynecology. Medical Times, New York. September, 1930